

What is claimed is:

- 1 1. An assembly of beam splitters, comprising:
 - 2 a roof-prism, comprising a first emitting/receiving
 - 3 surface, a roof surface and a first reflecting
 - 4 surface, when a beam of first wavelength enters
 - 5 the roof-prism through the first
 - 6 emitting/receiving surface, the beam of first
 - 7 wavelength is sequentially reflected by the
 - 8 first reflecting surface, the roof surface and
 - 9 the first emitting/receiving surface and leaves
 - 10 the roof-prism from the first reflecting
 - 11 surface;
 - 12 a triangle prism, comprising a second
 - 13 emitting/receiving surface, a second reflecting
 - 14 surface and a total internal reflecting
 - 15 surface, wherein the beam of first wavelength
 - 16 from the roof-prism enters the triangle prism
 - 17 through the total internal reflecting surface,
 - 18 and is sequentially reflected by the second
 - 19 reflecting surface and the total internal
 - 20 reflecting surface and leaves the triangle
 - 21 prism from the second emitting/receiving
 - 22 surface; and
 - 23 a complementary prism, which is adjacent to the
 - 24 second reflecting surface of the triangle
 - 25 prism, and comprises a third emitting/receiving
 - 26 surface and a fourth emitting/receiving
 - 27 surface;

28 wherein a beam of second wavelength enters the
29 complementary prism through the third
30 emitting/receiving surface and passes the
31 second reflecting surface to enter the triangle
32 prism, and then the beam of second wavelength
33 is emitted from the second emitting/receiving
34 surface of the triangle prism by reflecting by
35 the total internal reflecting surface, so that
36 the optical axis of the beam of second
37 wavelength and the optical axis of the beam of
38 first wavelength are coaxial; and

39 wherein a beam of third wavelength enters the
40 complementary prism through the fourth
41 emitting/receiving surface and passes the
42 second reflecting surface to enter the triangle
43 prism, and then the beam of third wavelength
44 passes the first reflecting surface to enter
45 the roof-prism and is sequentially reflected by
46 the first emitting/receiving surface, the roof
47 surface and the first reflecting surface so as
48 to emit from the first emitting/receiving
49 surface of the roof-prism, so that the optical
50 axis of the beam of third wavelength and the
51 optical axis of the beam of first wavelength
52 are coaxial.

1 2. The assembly of beam splitters as claimed in
2 claim 1, wherein the beam of first wavelength is
3 reflected by the second reflecting surface, and the beam

4 of second wavelength and the beam of third wavelength
5 travel through the second reflecting surface

1 3. The assembly of beam splitters as claimed in
2 claim 1, wherein the second emitting/receiving surface
3 and the total internal reflecting surface form a 48°
4 included angle, the second emitting/receiving surface and
5 the second reflecting surface form a 108° included angle,
6 the second reflecting surface and the total internal
7 reflecting surface form a 24° included angle, the third
8 emitting/receiving surface and the fourth
9 emitting/receiving surface form a 132° included angle,
10 the fourth emitting/receiving surface form a 132°
11 included angle, and the third emitting/receiving surface
12 and the second reflecting surface form a 24° included
13 angle.

1 4. The assembly of beam splitters as claimed in
2 claim 1, wherein the beam of second wavelength enters the
3 second emitting/receiving surface of the triangle prism
4 and is reflected to the complementary prism by the total
5 internal reflecting surface, so as to emit from the third
6 emitting/receiving surface of the complementary prism;

7 and the beam of third wavelength passes the first
8 emitting/receiving surface and is sequentially reflected
9 by the first reflecting surface, the roof surface and the
10 first emitting/receiving surface, and then the beam of
11 third wavelength travels through the triangle prism to
12 enter the complementary prism, so that the beam of third

13 wavelength is emitted from the fourth emitting/receiving
14 surface.

1 5. An assembly of beam, comprising:
2 a triangle prism comprising a second
3 emitting/receiving surface, a second reflecting
4 surface and a total internal reflecting
5 surface, wherein a beam of first wavelength
6 enters the triangle prism through the second
7 emitting/receiving surface and is sequentially
8 reflected by the total internal reflecting
9 surface and the second reflecting surface, so
10 as to emit from the total internal reflecting
11 surface;
12 a roof-prism comprising a first emitting/receiving
13 surface, a roof surface and a first reflecting
14 surface, wherein the beam of first wavelength
15 from the triangle prism enters the roof-prism
16 through the first reflecting surface, and is
17 sequentially reflected by the first
18 emitting/receiving surface, the roof surface
19 and the first reflecting surface, so as to emit
20 from the first emitting/receiving surface; and
21 a complementary prism, which is adjacent to the
22 second reflecting, and comprises a third
23 emitting/receiving surface and a fourth
24 emitting/receiving surface;
25 wherein a beam of second wavelength enters the
26 complementary prism through the third
27 emitting/receiving surface and passes the

28 second reflecting surface to enter the triangle
29 prism, the beam of second wavelength is
30 reflected by the total internal reflecting
31 surface and emitted from the second
32 emitting/receiving surface of the triangle
33 prism, so that the optical axis of the beam of
34 second wave-length and the optical axis of the
35 beam of first wavelength are coaxial; and
36 wherein a beam of third wavelength enters the
37 complementary prism through the fourth
38 emitting/receiving surface and passes the
39 second reflecting surface to enter the triangle
40 prism, the beam of third wavelength passes the
41 first reflecting surface to enter the roof-
42 prism and is sequentially reflected by the
43 first emitting/receiving surface, the roof
44 surface and the total internal reflecting
45 surface and emitted from the first
46 emitting/receiving surface of roof-prism, so
47 that the optical axis of the beam of third
48 wavelength and the optical axis of the beam of
49 first wavelength are coaxial.

1 6. The assembly of beam splitters as claimed in
2 claim 5, wherein the beam of first wavelength is
3 reflected by the second reflecting surface, and the beam
4 of second wavelength and the beam of third wavelength
5 passes through the second reflecting surface.

1 7. The assembly of beam splitters as claimed in
2 claim 5, wherein the second emitting/receiving surface

3 and the total internal reflecting surface form a 48°
4 included angle, the second emitting/receiving surface and
5 the second reflecting surface form a 108° included angle,
6 the second reflecting surface and the total internal
7 reflecting surface form a 24° included angle, the third
8 emitting/receiving surface and the fourth
9 emitting/receiving surface form a 132° included angle,
10 the fourth emitting/receiving surface and the second
11 emitting/receiving surface form a 132° included angle,
12 and the third emitting/receiving surface and the second
13 reflecting surface form a 24° included angle.

1 8. The assembly of beam splitters as claimed in
2 claim 5, wherein the beam of second wavelength enters the
3 triangle prism through the second emitting/receiving
4 surface and is reflected to the complementary prism by
5 the total internal reflecting surface, so as to emit from
6 the third emitting/receiving surface of the complementary
7 prism; and

8 the beam of third wavelength enters the roof-prism
9 through the first emitting/receiving surface and is
10 sequentially reflected by the first reflecting surface,
11 the roof surface and the first emitting/receiving
12 surface, and then the beam of third wavelength travels
13 through the triangle prism to enter the complementary
14 prism, so that the beam of third wavelength is emitted
15 from the fourth emitting/receiving surface.

1 9. A rangefinder for measuring the distance
2 between user and a target, comprising:

3 a viewing/emitting optical system, comprising
4 a first object lens, receiving an image produced
5 from the target;
6 an assembly of beam splitters as claimed in claim 1,
7 wherein the image following the path of the
8 beam of first wavelength is incident on the
9 first emitting/receiving surface and emits from
10 the second emitting/receiving surface;
11 an ocular lens, which receives the image from the
12 assembly of beam splitters and let user see the
13 target;
14 an emitter, emitting an invisible beam toward the
15 fourth emitting/receiving surface of the
16 assembly of beam splitters, wherein the
17 invisible beam following the path of the beam
18 of third wavelength is emitted from the first
19 emitting/receiving surface, and passes the
20 first object lens to travel toward the target;
21 and
22 a display, emitting a narrow-band beam toward the
23 third emitting/receiving surface of the
24 assembly of beam splitters and shows the
25 distance, wherein the narrow-band beam
26 following the path of the beam of second
27 wavelength is emitted from the second
28 emitting/receiving surface, and shown for user
29 by the ocular lens; and
30 a receiving optical system, comprising
31 a second object lens, receiving the invisible beam
32 reflected from the target; and

33 a detector, receiving the invisible beam passing
34 through the second object lens.

1 10. The rangefinder as claimed in claim 9, said
2 emitter is a laser diode.

1 11. The rangefinder as claimed in claim 9, said
2 display is a liquid crystal display, a LED display or an
3 OLED display.

1 12. A rangefinder for measuring the distance
2 between user and a target, comprising:
3 an emitting optical system, comprising
4 an emitter, emitting an invisible beam; and
5 a second object lens, guiding the invisible beam to
6 the target; and
7 a viewing/receiving optical system, comprising
8 a first object lens, receiving an image produced
9 from the target and the invisible light
10 reflected from the target;
11 an assembly of beam splitters as claimed in claim 1,
12 wherein the image following the path of the
13 beam of first wavelength is incident on the
14 first emitting/receiving surface and emits from
15 the second emitting/receiving surface, and the
16 invisible beam following the path of the beam
17 of third wavelength is incident on the first
18 emitting/receiving surface and emits from the
19 fourth emitting/receiving surface;

20 an ocular lens, which receives the image from the
21 assembly of beam splitters and let user see the
22 target;
23 a detector, receiving the invisible beam from the
24 fourth emitting/receiving surface; and
25 a display, emitting a narrow-band beam toward the
26 third emitting/receiving surface of the
27 assembly of beam splitters and shows the
28 distance, wherein the narrow-band beam
29 following the path of the beam of second
30 wavelength is emitted from the second
31 emitting/receiving surface, and shown for user
32 by the ocular lens.

1 13. The rangefinder as claimed in claim 12, said
2 emitter is a laser diode.

1 14. The rangefinder as claimed in claim 12, said
2 display is a liquid crystal display, a LED display, or an
3 OLED display.

1 15. A rangefinder for measuring the distance
2 between user and a target, comprising:
3 a viewing/emitting optical system, comprising
4 a first object lens, receiving an image produced
5 from the target;
6 an assembly of beam splitters as claimed in claim 5,
7 wherein the image flowing the path of the beam
8 of first wavelength is incident on the second
9 emitting/receiving surface and emitted from the
10 first emitting/receiving surface;

11 an ocular lens, which receives the image from the
12 assembly of beam splitters and let user see the
13 target;
14 an emitter, emitting an invisible beam toward the
15 third emitting/receiving surface of the
16 assembly of beam splitters, wherein the
17 invisible beam following the path of the beam
18 of second wavelength is emitted from the second
19 emitting/receiving surface, and passes the
20 first object lens to travel toward the target;
21 and
22 a display, emitting a narrow-band beam toward the
23 fourth emitting/receiving surface of the
24 assembly of beam splitters and shows the
25 distance, wherein the narrow-band beam
26 following the path of the beam of third
27 wavelength is emitted from the first
28 emitting/receiving surface, and shown for user
29 by the ocular lens; and
30 a receiving optical system, comprising
31 a second object lens, receiving the invisible beam
32 reflected from the target; and
33 a detector, receiving the invisible beam passing
34 through the second object lens.

1 16. The rangefinder as claimed in claim15, said
2 emitter is a laser diode.

1 17. The rangefinder as claimed in claim 15, said
2 display is a liquid crystal display, a LED display, or an
3 OLED display.

1 18. A rangefinder for measuring the distance
2 between user and a target, comprising:

3 an emitting optical system, comprising
4 an emitter, emitting an invisible beam; and
5 a second object lens, guiding the invisible beam to
6 the target; and

7 a viewing/receiving optical system, comprising
8 a first object lens, receiving an image produced
9 from the target and the invisible light
10 reflected from the target;

11 an assembly of beam splitters as claimed in claim 5,
12 wherein the image following the path of the
13 beam of first wavelength is incident on the
14 second emitting/receiving surface and emits
15 from the first emitting/receiving surface, and
16 the invisible beam following the path of the
17 beam of second wavelength is incident on the
18 second emitting/receiving surface and emits
19 from the third emitting/receiving surface;

20 an ocular lens, which receives the image from the
21 assembly of beam splitters and let user see the
22 target;

23 a detector, receiving the invisible beam from the
24 third emitting/receiving surface; and

25 a display, emitting a narrow-band beam toward the
26 fourth emitting/receiving surface of the
27 assembly of beam splitters and shows the
28 distance, wherein the narrow-band beam
29 following the path of the beam of third

30 wavelength is emitted from the first
31 emitting/receiving surface, and shown for user
32 by the ocular lens.

1 19. The rangefinder as claimed in claim 18, said
2 emitter is a laser diode.

1 20. The rangefinder as claimed in claim 18, said
2 display is a liquid crystal display, a LED display, or an
3 OLED display.